

## Algebra V (2) Factorising Quadratics with double brackets

Do now:

Factorise these completely.

1  $5x^3 + 15x^4$

2  $27a^4 + 9a^2$

3  $3x^3 - 18x^2$

4  $24p^4 - 6p^5$

5  $9x^3y^2 - 12x^2y^4$

6  $8xy^3 - 24x^3y$

Extension

25  $(x - y)^2 - (x - y)^3$

26  $x(x + 1)(x + 3)(x + 5) - x(x + 3)(x + 5)$

Can you spot a pattern.....

$$\begin{array}{l} a^2 + 5a + 6 \\ (a + 2)(a + 3) \end{array}$$

$$\begin{array}{l} t^2 + 7t + 10 \\ (t + 5)(t + 2) \end{array}$$

$$\begin{array}{l} m^2 - 5m + 6 \\ (m - 2)(m - 3) \end{array}$$

$$\begin{array}{l} y^2 + 25y + 100 \\ (y + 20)(y + 5) \end{array}$$

$$\begin{array}{l} x^2 + x - 6 \\ (x - 2)(x + 3) \end{array}$$

$$\begin{array}{l} x^2 - 4x + 4 \\ (x - 2)^2 \end{array}$$

## Worked Example

$$x^2 - 10x + 21 =$$

$$x^2 + 14x + 24 =$$

**9**  $x^2 + x - 56$

**10**  $x^2 + 32x + 60$

**11**  $x^2 - 6x - 27$

**12**  $x^2 + 16x - 80$

## Your Turn

$$x^2 + 10x + 21 =$$

$$x^2 - 2x - 24 =$$

**13**  $x^2 + 14x + 13$

**14**  $x^2 + 12x - 28$

**15**  $x^2 + 2x - 80$

**16**  $x^2 - 11x + 30$

**17**  $x^2 + 8x - 48$

**21**  $x^2 + 11x + 24$

**18**  $x^2 + 18x + 72$

**22**  $x^2 - 11x - 42$

**19**  $x^2 + 17x + 52$

**23**  $x^2 - 18x + 32$

**20**  $x^2 - 12x - 28$

**24**  $x^2 - 7x - 60$

Factorise  $6 + x^2 - 5x$

This needs to be rearranged into the familiar form,  
i.e.  $x^2$  term first, then the  $x$  term and finally the number.

$$\begin{aligned} 6 + x^2 - 5x &= x^2 - 5x + 6 \\ &= (x - 2)(x - 3) \end{aligned}$$

Possible pairs:  
1, 6, sum 7, reject  
2, 3, sum 5, correct.

**25**  $8 + x^2 + 9x$

**29**  $9 + x^2 + 6x$

**26**  $9 + x^2 - 6x$

**30**  $8 + x^2 - 9x$

**27**  $11x + 28 + x^2$

**31**  $17x + 30 + x^2$

Factorise  $x^2 + 6x + 9$

If you cannot see the numbers required, write down all the pairs whose product is 9.

$$\begin{aligned}x^2 + 6x + 9 &= (x + 3)(x + 3) \\ &= (x + 3)^2\end{aligned}$$

$3 \times 3$  or  
 $1 \times 9$

Factorise

**41**  $x^2 + 10x + 25$

**45**  $x^2 + 12x + 36$

**42**  $x^2 - 10x + 25$

**46**  $x^2 - 12x + 36$

**43**  $x^2 + 4x + 4$

**47**  $x^2 - 4x + 4$

Factorise  $6 - 5x - x^2$

When the  $x^2$  term is negative, the terms should be arranged: number term, then the  $x$  term and finally the  $x^2$  term. This means that the  $x$  term appears at the end of each bracket.

$$6 - 5x - x^2 = (6 + x)(1 - x)$$

$2 \times 3$  or  
 $6 \times 1$

Factorise

**1**  $2 - x - x^2$

**5**  $6 - x - x^2$

**2**  $6 + x - x^2$

**6**  $2 + x - x^2$

**3**  $4 - 3x - x^2$

**7**  $8 - 2x - x^2$

**4**  $8 + 2x - x^2$

**8**  $5 - 4x - x^2$